Aircraft Derived Wind and Temperature Observations on a Global Scale

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Introduction
Mode-S enhanced surveillance (Mode-S EHS) derived meteorological data have the potential to be a very valuable source of high quality wind observations from aircraft [1,2,3]. Mode-S EHS is an air traffic management standard where an aircraft transmits a set of messages about their current situation. These messages provide both the aircrafts vector through the air and the vector along the ground. The difference between these two vectors is the wind acting on the aircraft. It is also possible to derive temperature observations using the reported Mach number and the true airspeed [3].

Global Satellite Reception
There have been several advances in the detection of ADS-B data using satellites to enable Air Traffic Control (ATC) to track aircraft with no breaks in coverage [4]. Recently, the European Space Agency (ESA) and GomSpace have completed a mission to demonstrate the potential to use a cubesat (GomX-3, shown in figure 4) to detect ADS-B data to track aircraft from space.

- These advances have opened up the possibility of considering global Mode-S EHS data coverage without the need to deploy 100’s of ground stations. As such, the Met Office, ESA and GomSpace are currently working together to map the potential coverage of Mode-S EHS data across the globe and to assess the economic value of collecting the data using a satellite platform.

UK Network
- Network of 6 receivers.
- The receivers gather Mode-S EHS messages and Automated Dependent Surveillance Broadcast (ADS-B) (position data) messages.
- The network derives around 5.5 million wind observations every day from the UK, and around 900 profiles.
- Observation – Background statistics (UK-V 1.5 km) of a similar quality to those generated for AMDAR.

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References